FIG.1

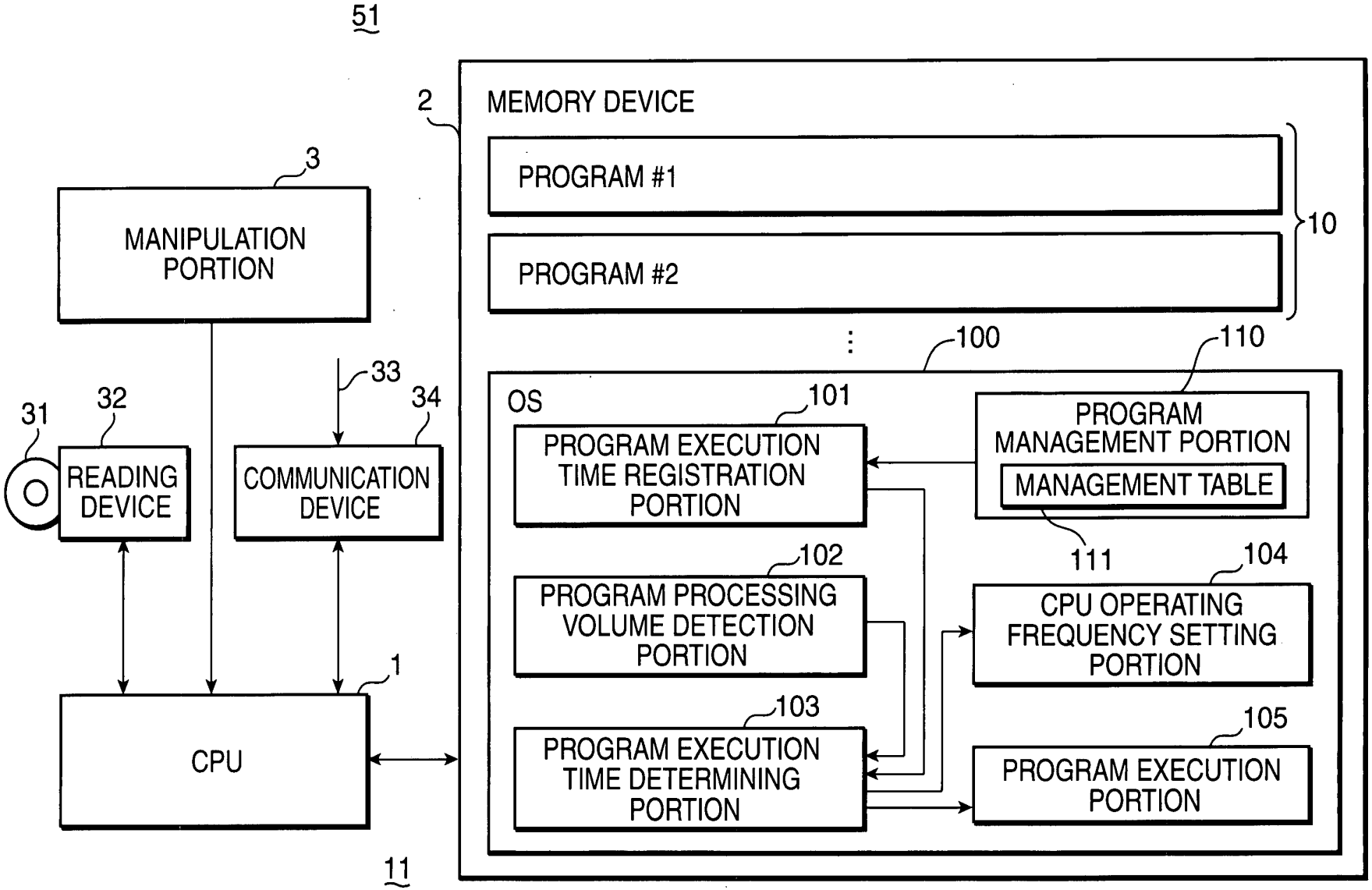

51
2
MEMORY DEVICE
PROGRAM #1
PROGRAM #2
10
3
MANIPULATION PORTION
100
110
OS
101
PROGRAM EXECUTION TIME REGISTRATION PORTION
PROGRAM MANAGEMENT PORTION
MANAGEMENT TABLE
111
102
PROGRAM PROCESSING VOLUME DETECTION PORTION
104
CPU OPERATING FREQUENCY SETTING PORTION
103
PROGRAM EXECUTION TIME DETERMINING PORTION
105
PROGRAM EXECUTION PORTION
31
32
READING DEVICE
33
34
COMMUNICATION DEVICE
1
CPU
11

FIG.2

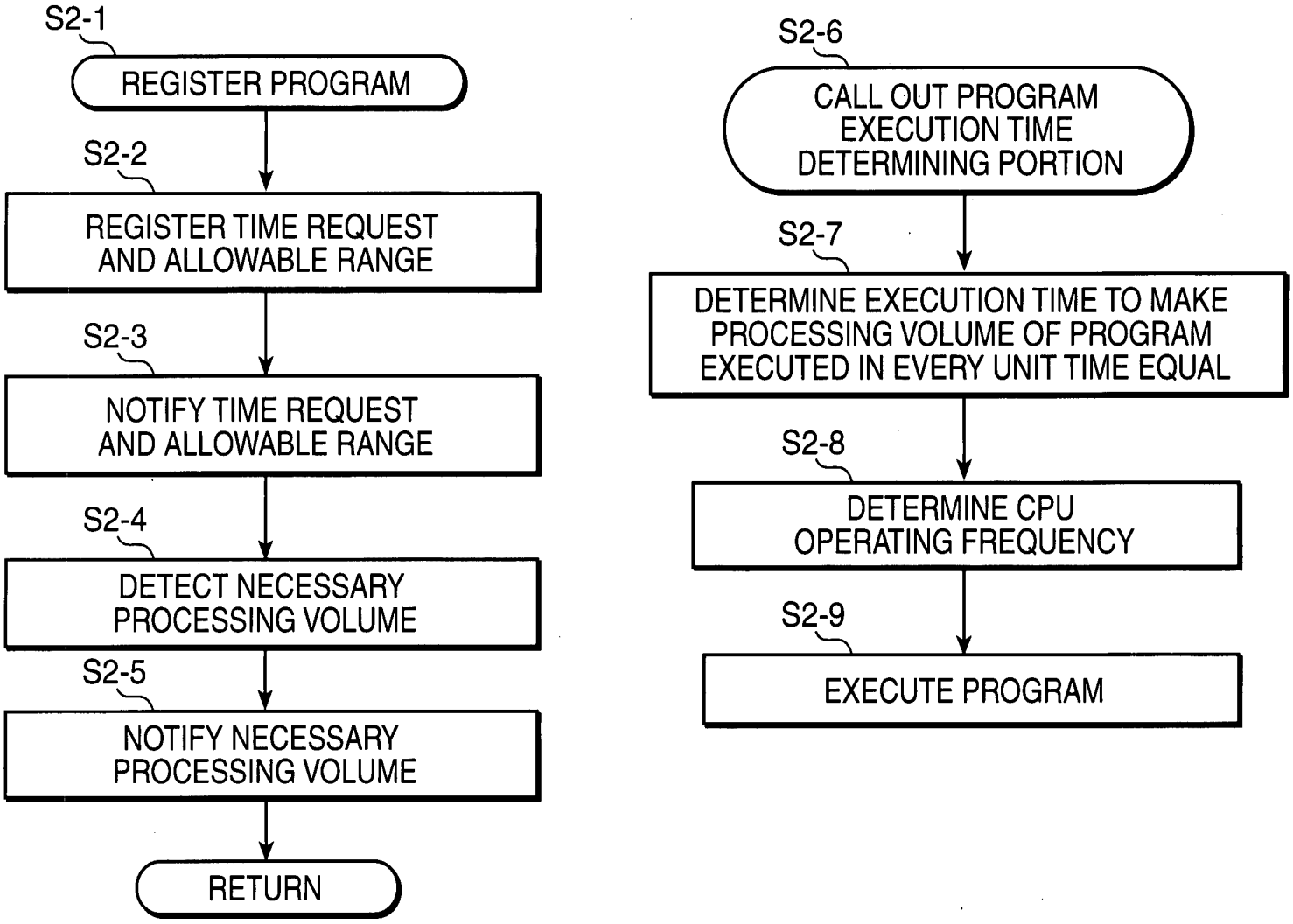

S2-1
REGISTER PROGRAM
S2-2
REGISTER TIME REQUEST AND ALLOWABLE RANGE
S2-3
NOTIFY TIME REQUEST AND ALLOWABLE RANGE
S2-4
DETECT NECESSARY PROCESSING VOLUME
S2-5
NOTIFY NECESSARY PROCESSING VOLUME
RETURN
S2-6
CALL OUT PROGRAM EXECUTION TIME DETERMINING PORTION
S2-7
DETERMINE EXECUTION TIME TO MAKE PROCESSING VOLUME OF PROGRAM EXECUTED IN EVERY UNIT TIME EQUAL
S2-8
DETERMINE CPU OPERATING FREQUENCY
S2-9
EXECUTE PROGRAM

FIG.3A1

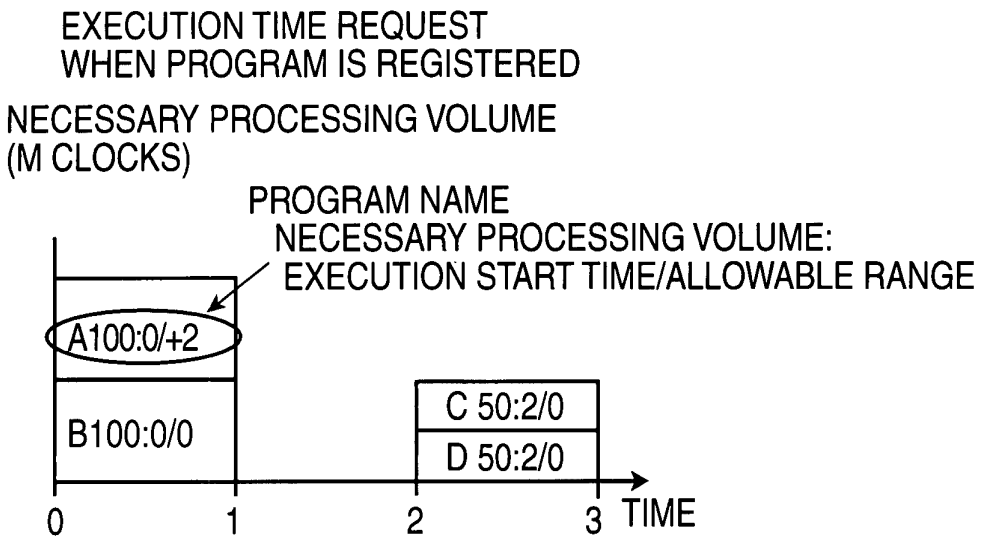


FIG.3A2

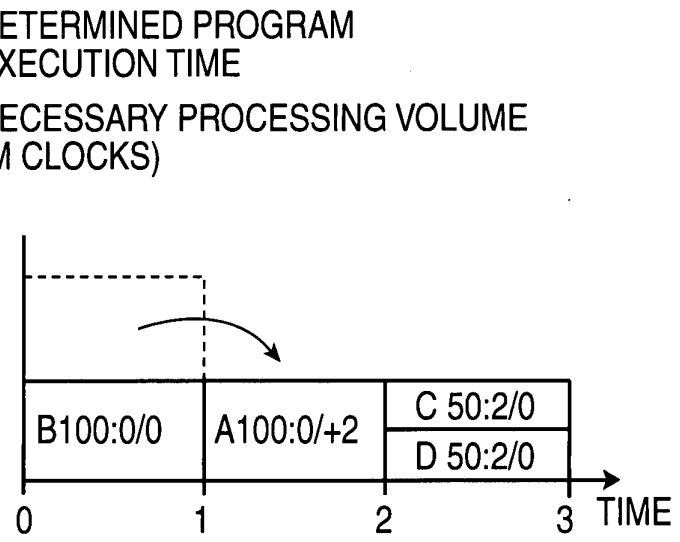
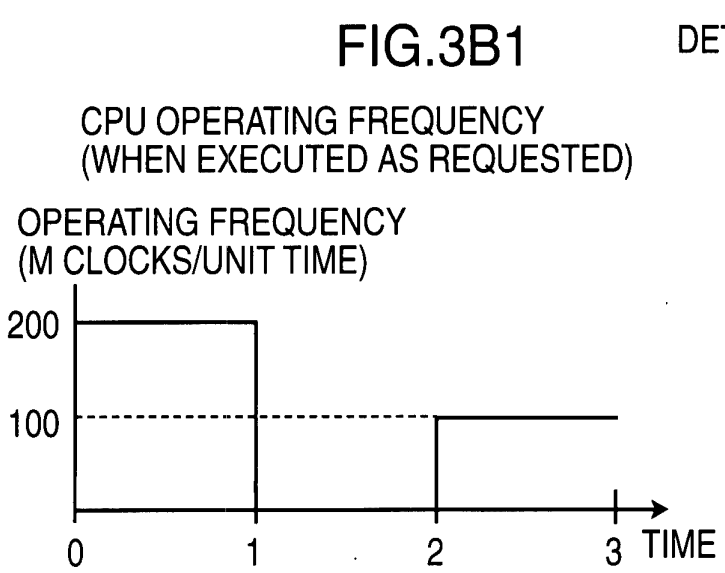


FIG.3B1



DETERMINE PROGRAM EXECUTION TIME

FIG.3B2

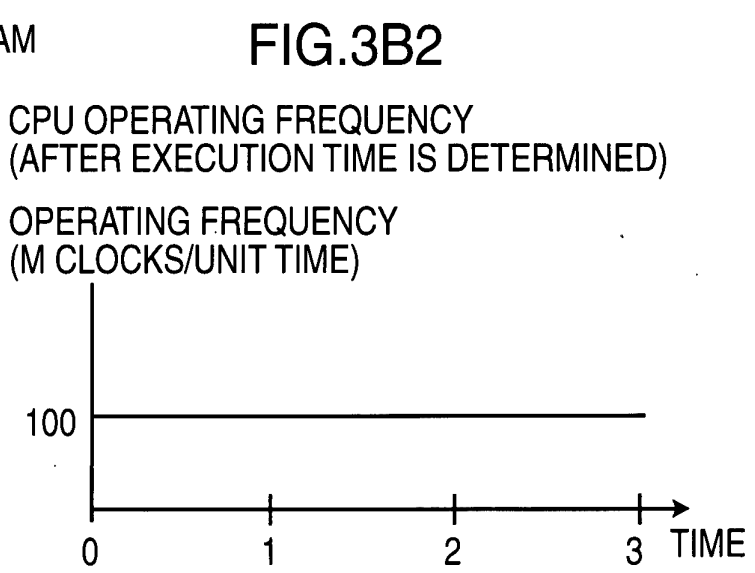


FIG.4A1

EXECUTION TIME REQUEST
WHEN PROGRAM IS REGISTERED

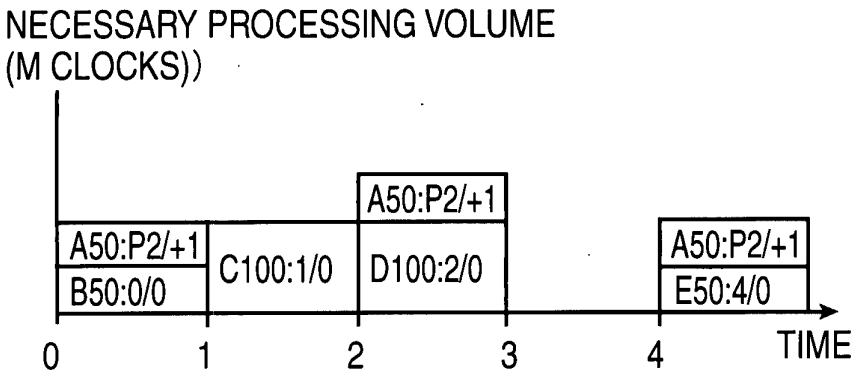


FIG.4A2

DETERMINED PROGRAM EXECUTION TIME

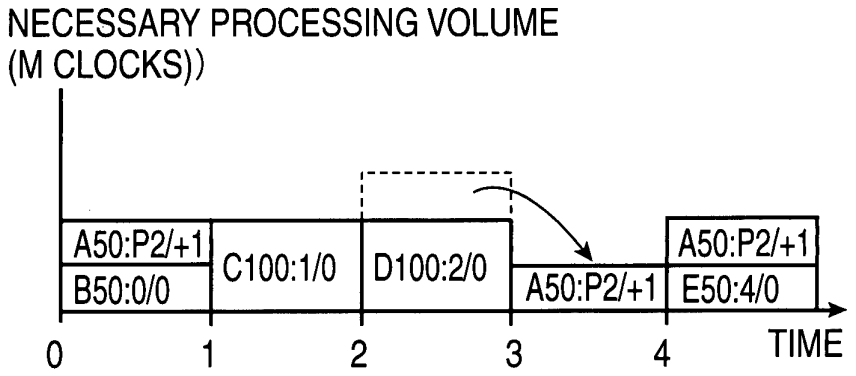
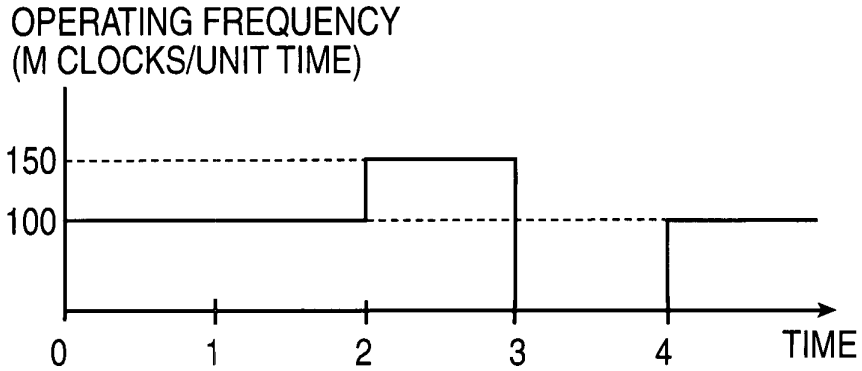


FIG.4B1

CPU OPERATING FREQUENCY
(WHEN EXECUTED AS REQUESTED)



DETERMINE PROGRAM EXECUTION TIME

FIG.4B2

CPU OPERATING FREQUENCY
(AFTER EXECUTION TIME IS DETERMINED)

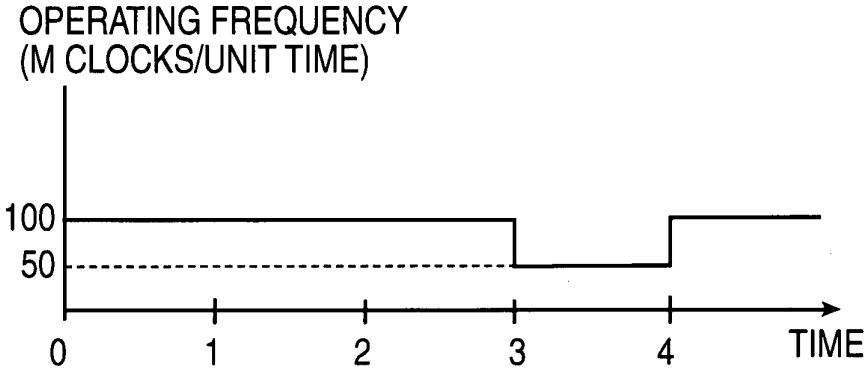


FIG.5

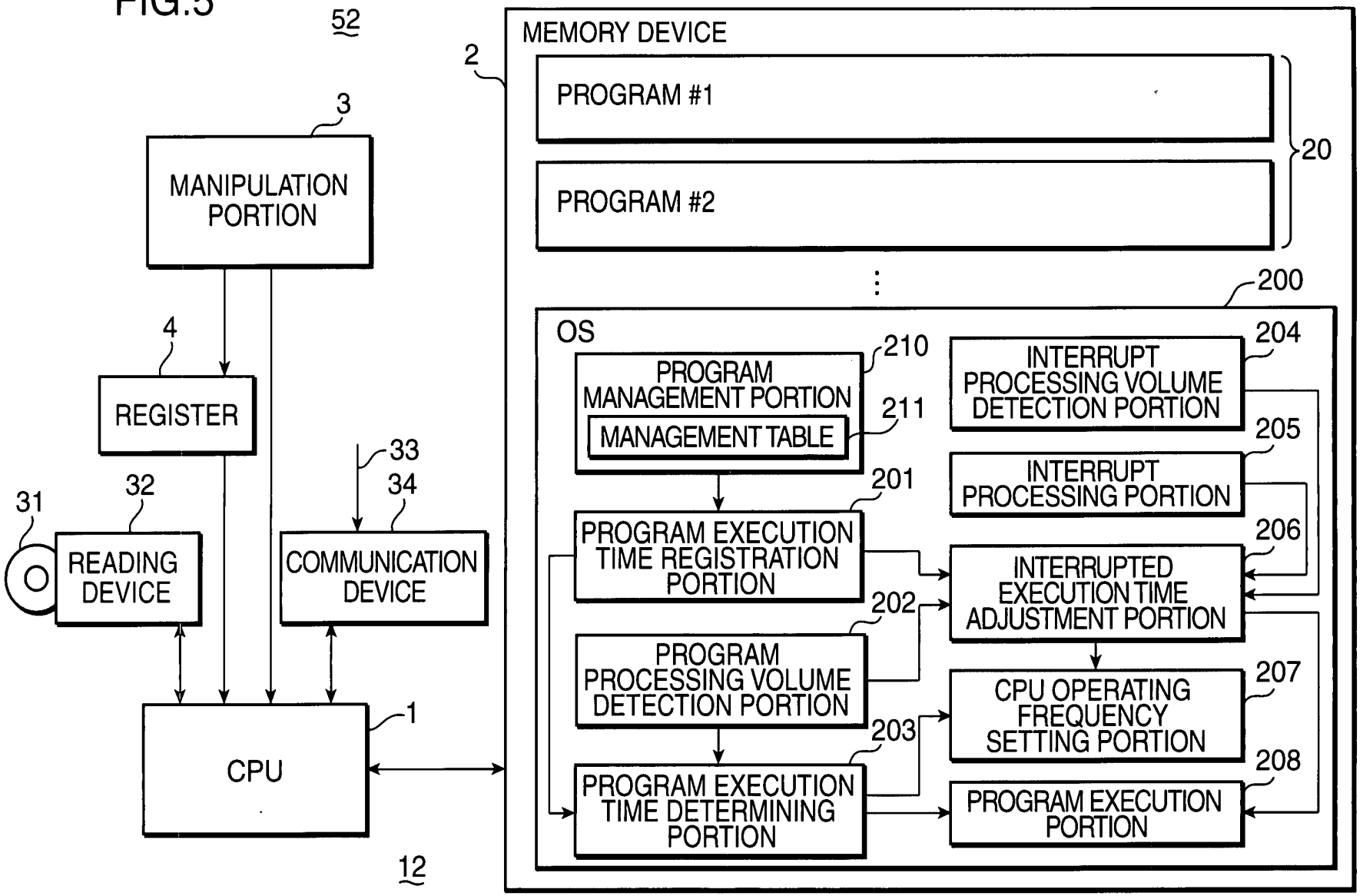

52
MEMORY DEVICE
2
PROGRAM #1
PROGRAM #2
20
3
MANIPULATION PORTION
200
OS
4
REGISTER
210
PROGRAM MANAGEMENT PORTION
211
MANAGEMENT TABLE
204
INTERRUPT PROCESSING VOLUME DETECTION PORTION
205
INTERRUPT PROCESSING PORTION
33
34
32
31
201
PROGRAM EXECUTION TIME REGISTRATION PORTION
206
INTERRUPTED EXECUTION TIME ADJUSTMENT PORTION
READING DEVICE
COMMUNICATION DEVICE
202
PROGRAM PROCESSING VOLUME DETECTION PORTION
207
CPU OPERATING FREQUENCY SETTING PORTION
1
203
208
PROGRAM EXECUTION TIME DETERMINING PORTION
PROGRAM EXECUTION PORTION
CPU
12

FIG.6

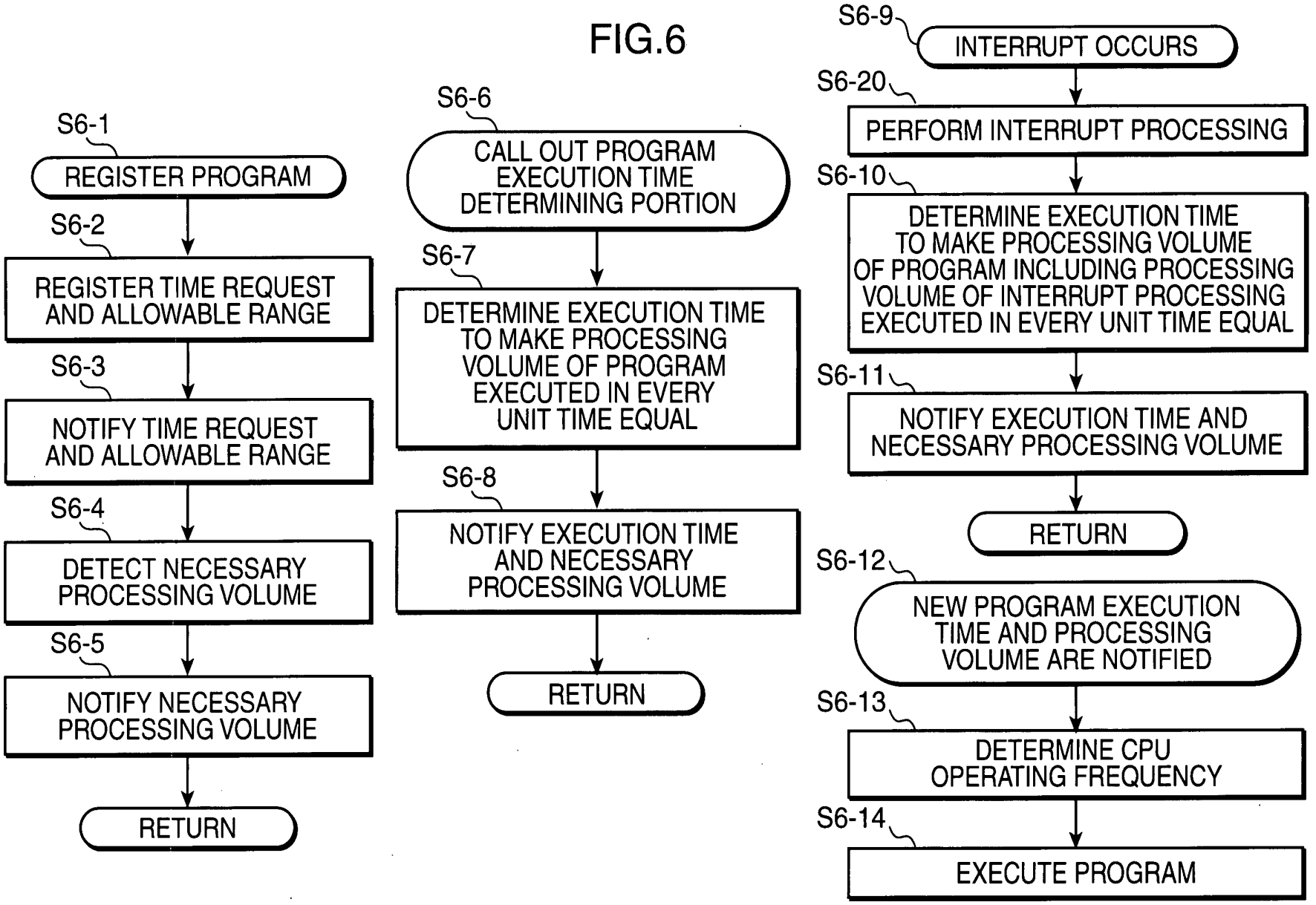

S6-1
REGISTER PROGRAM
S6-2
REGISTER TIME REQUEST AND ALLOWABLE RANGE
S6-3
NOTIFY TIME REQUEST AND ALLOWABLE RANGE
S6-4
DETECT NECESSARY PROCESSING VOLUME
S6-5
NOTIFY NECESSARY PROCESSING VOLUME
RETURN
S6-6
CALL OUT PROGRAM EXECUTION TIME DETERMINING PORTION
S6-7
DETERMINE EXECUTION TIME TO MAKE PROCESSING VOLUME OF PROGRAM EXECUTED IN EVERY UNIT TIME EQUAL
S6-8
NOTIFY EXECUTION TIME AND NECESSARY PROCESSING VOLUME
RETURN
S6-9
INTERRUPT OCCURS
S6-20
PERFORM INTERRUPT PROCESSING
S6-10
DETERMINE EXECUTION TIME TO MAKE PROCESSING VOLUME OF PROGRAM INCLUDING PROCESSING VOLUME OF INTERRUPT PROCESSING EXECUTED IN EVERY UNIT TIME EQUAL
S6-11
NOTIFY EXECUTION TIME AND NECESSARY PROCESSING VOLUME
RETURN
S6-12
NEW PROGRAM EXECUTION TIME AND PROCESSING VOLUME ARE NOTIFIED
S6-13
DETERMINE CPU OPERATING FREQUENCY
S6-14
EXECUTE PROGRAM

FIG.7A1

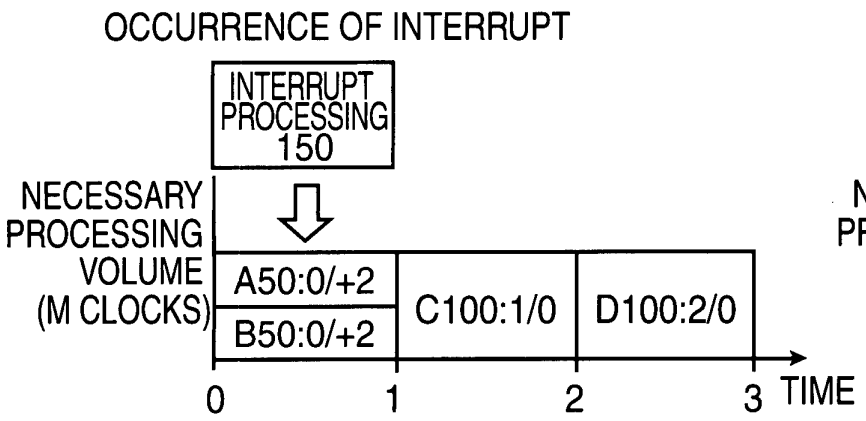


FIG.7A2

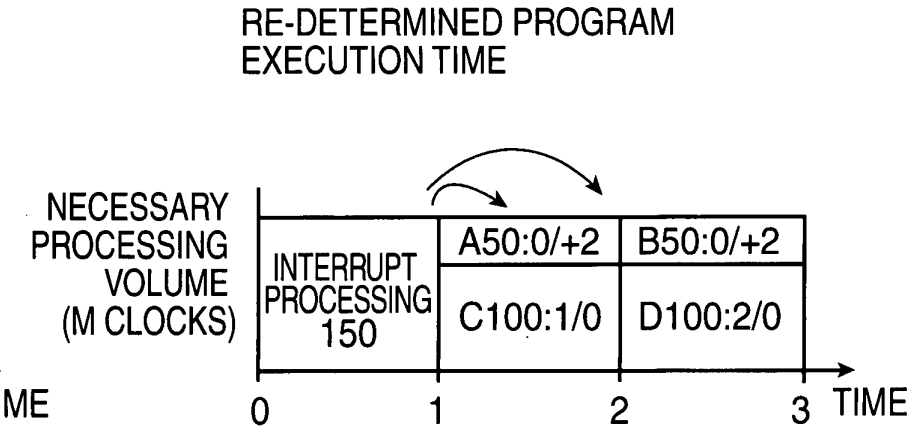
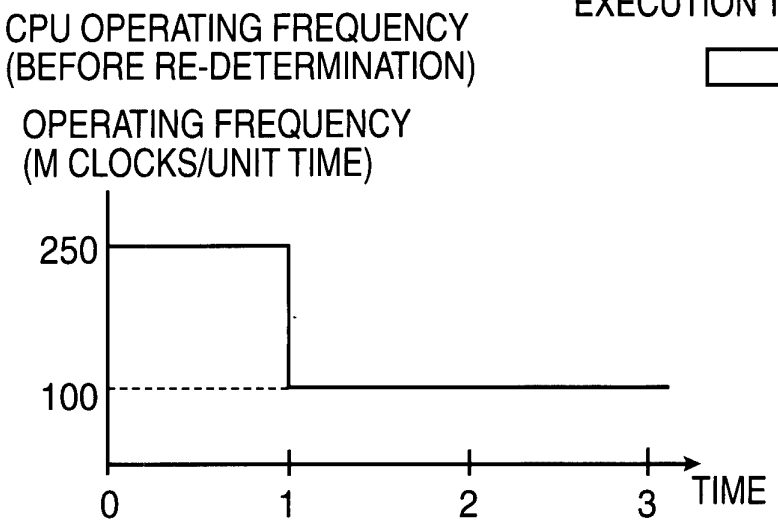


FIG.7B1



DETERMINE PROGRAM EXECUTION TIME

FIG.7B2

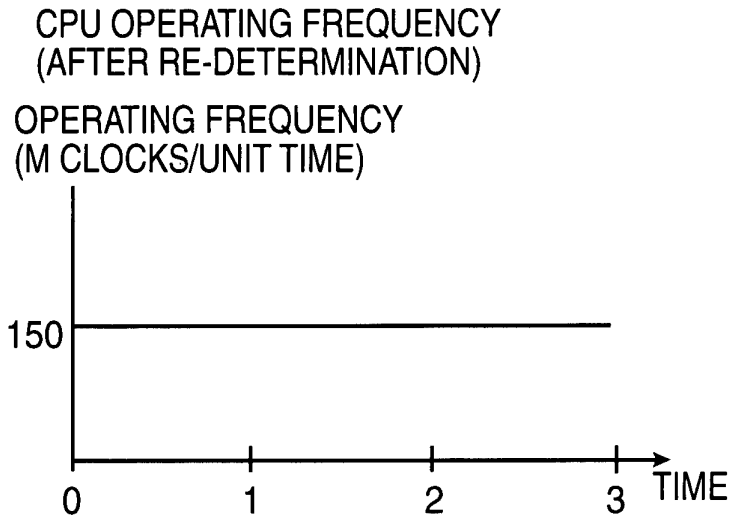


FIG.8

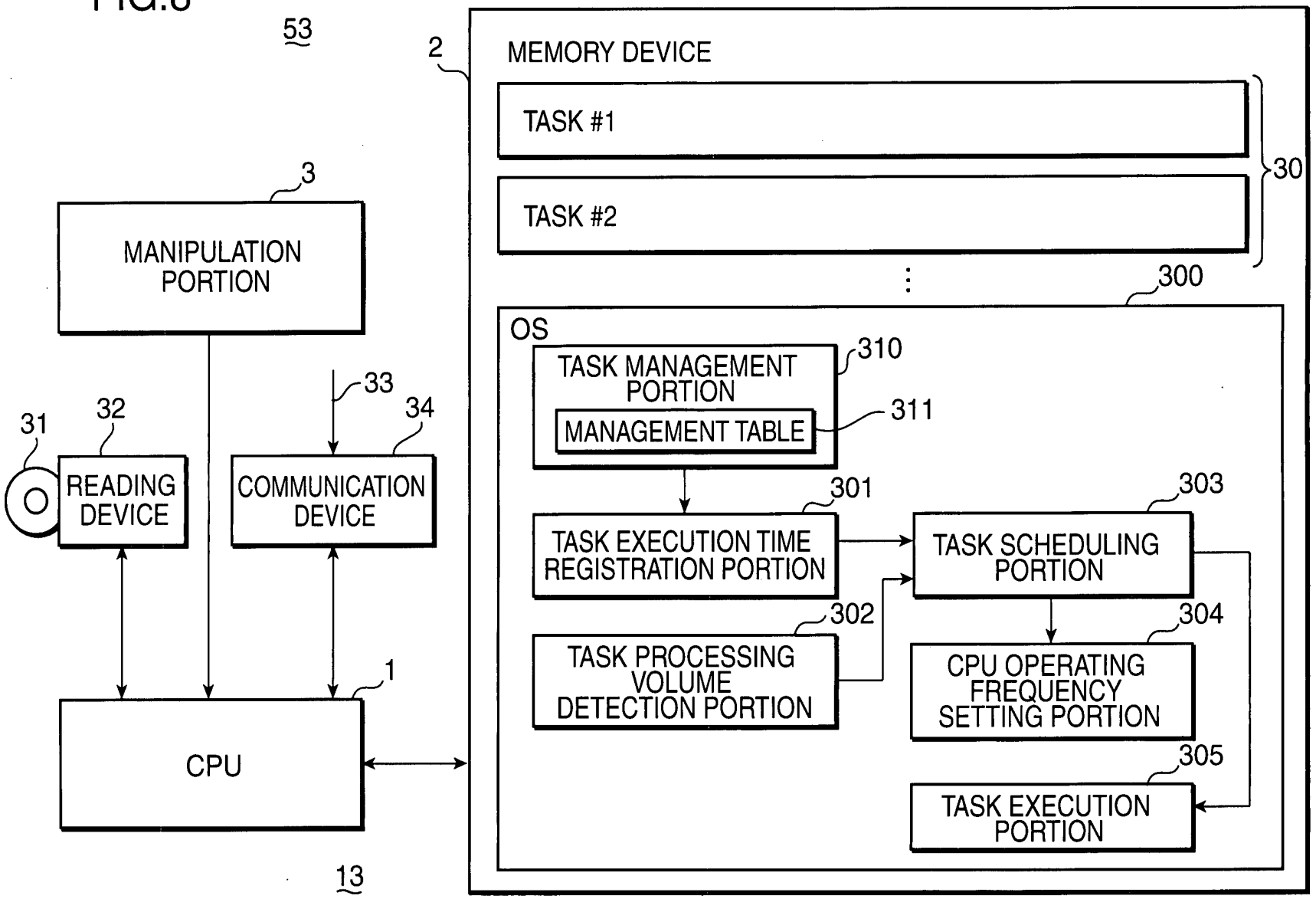

53
2
MEMORY DEVICE
TASK #1
TASK #2
30
3
MANIPULATION PORTION
300
OS
TASK MANAGEMENT PORTION
310
MANAGEMENT TABLE
311
31
32
33
34
READING DEVICE
COMMUNICATION DEVICE
301
303
TASK EXECUTION TIME REGISTRATION PORTION
TASK SCHEDULING PORTION
302
304
TASK PROCESSING VOLUME DETECTION PORTION
CPU OPERATING FREQUENCY SETTING PORTION
305
TASK EXECUTION PORTION
1
CPU
13

FIG.9

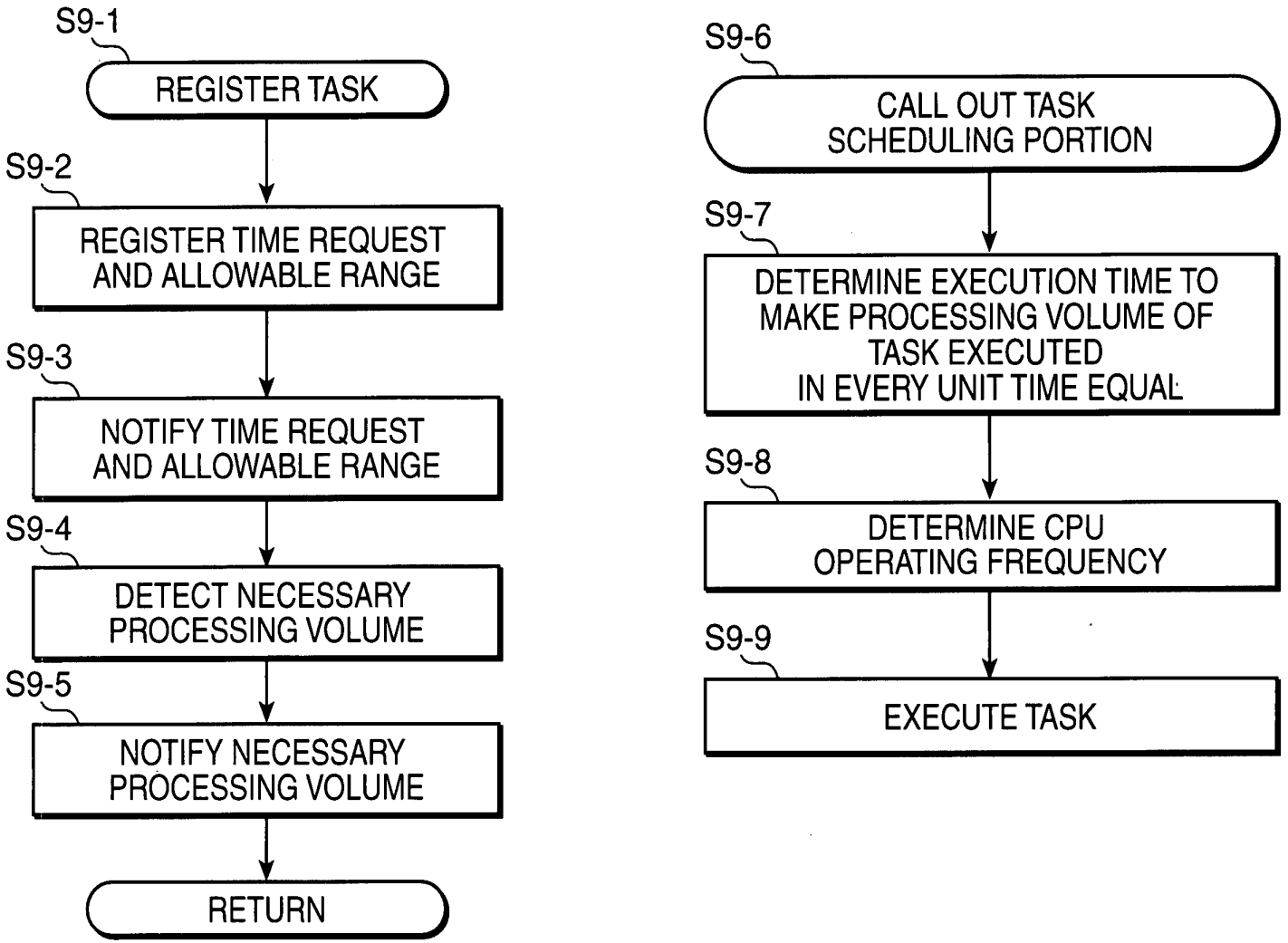

S9-1
REGISTER TASK
S9-2
REGISTER TIME REQUEST AND ALLOWABLE RANGE
S9-3
NOTIFY TIME REQUEST AND ALLOWABLE RANGE
S9-4
DETECT NECESSARY PROCESSING VOLUME
S9-5
NOTIFY NECESSARY PROCESSING VOLUME
RETURN
S9-6
CALL OUT TASK SCHEDULING PORTION
S9-7
DETERMINE EXECUTION TIME TO MAKE PROCESSING VOLUME OF TASK EXECUTED IN EVERY UNIT TIME EQUAL
S9-8
DETERMINE CPU OPERATING FREQUENCY
S9-9
EXECUTE TASK

FIG.10A1

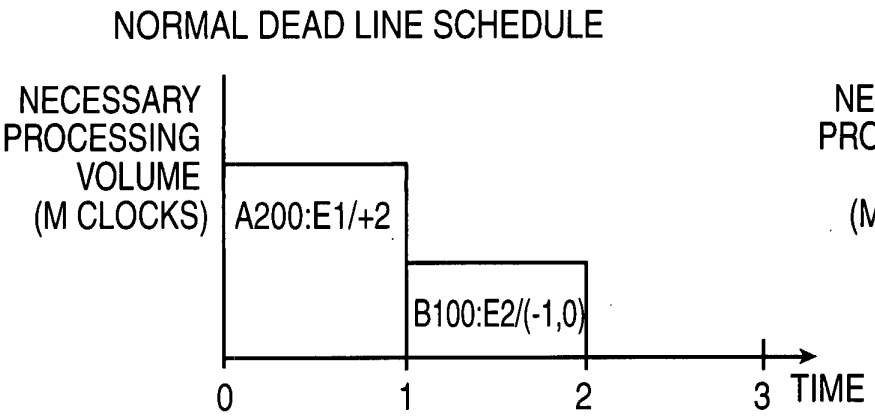


FIG.10A2

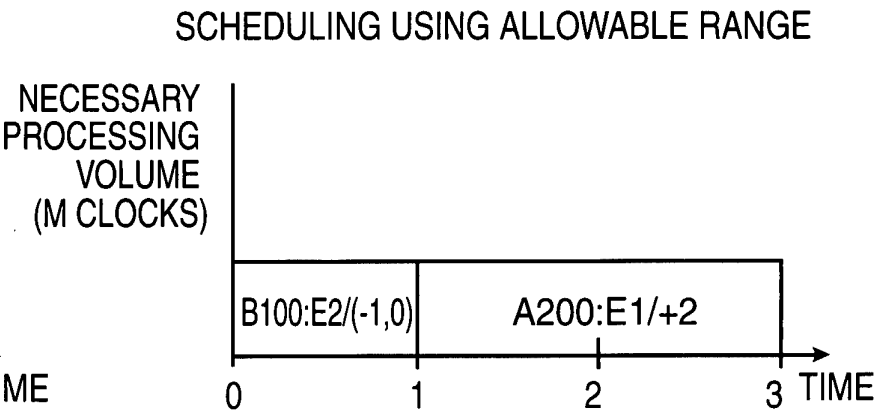


FIG.10B1

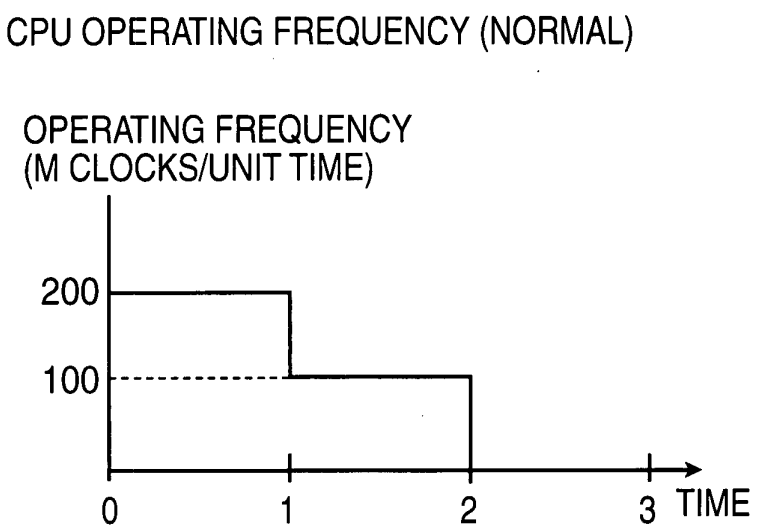


FIG.10B2

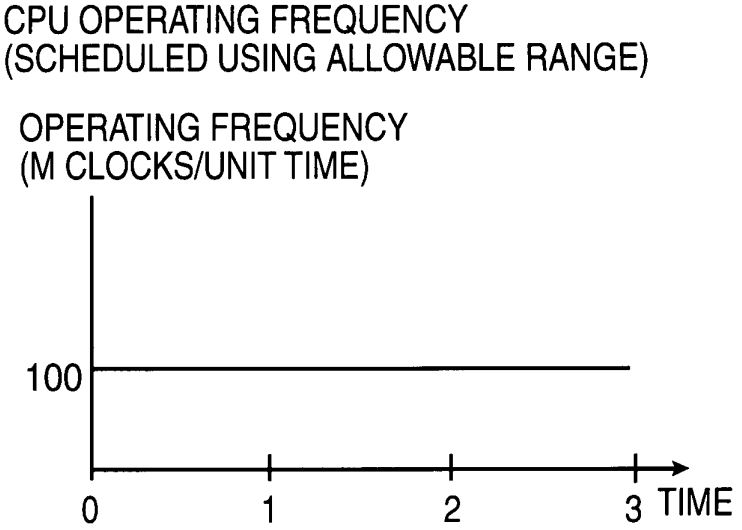


FIG.11

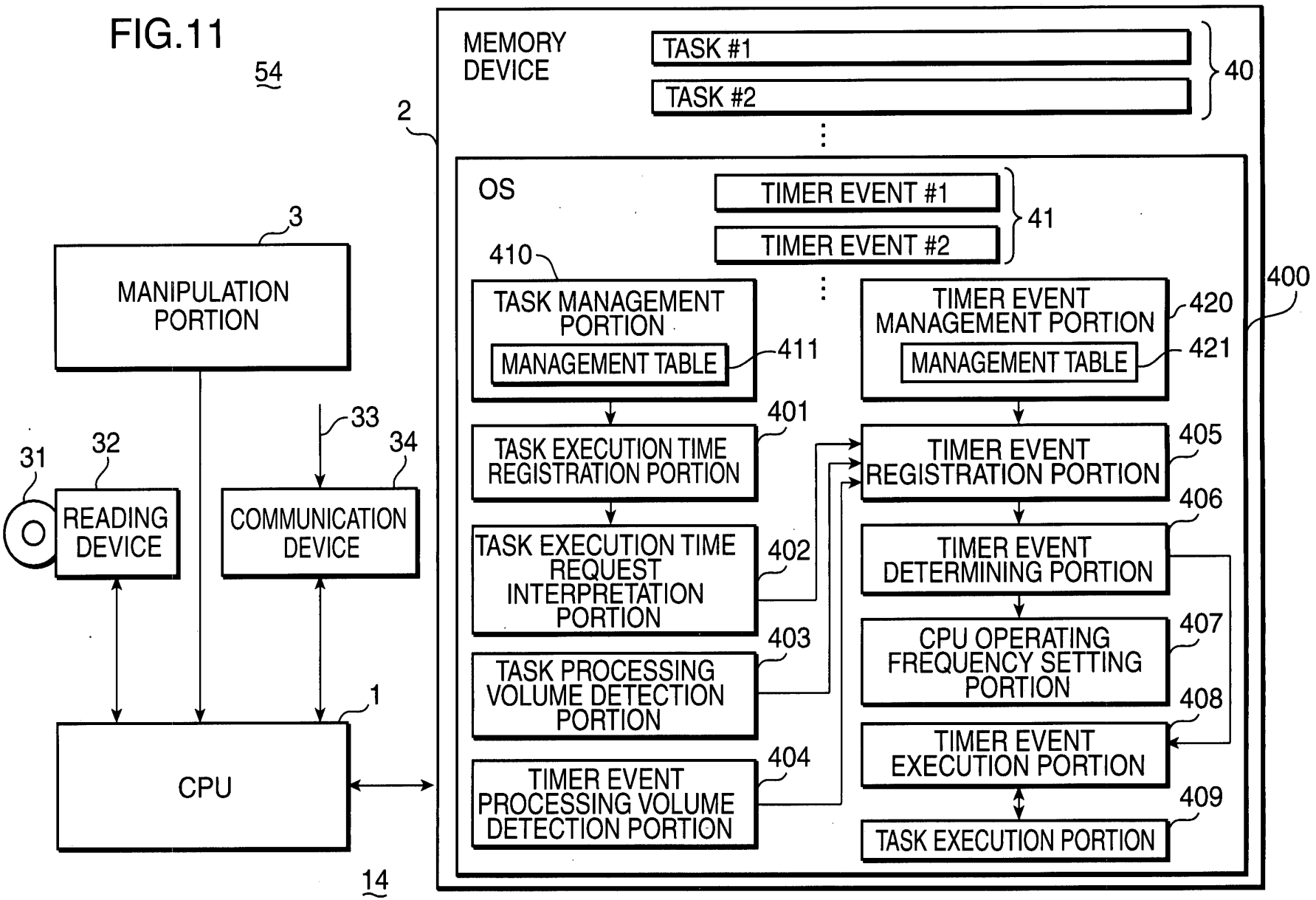

54
MEMORY DEVICE
TASK #1
TASK #2
40
2
OS
TIMER EVENT #1
TIMER EVENT #2
41
400
3
MANIPULATION PORTION
410
TASK MANAGEMENT PORTION
MANAGEMENT TABLE
411
TIMER EVENT MANAGEMENT PORTION
420
MANAGEMENT TABLE
421
33
34
31
32
READING DEVICE
COMMUNICATION DEVICE
401
TASK EXECUTION TIME REGISTRATION PORTION
405
TIMER EVENT REGISTRATION PORTION
406
TASK EXECUTION TIME REQUEST INTERPRETATION PORTION
402
TIMER EVENT DETERMINING PORTION
403
CPU OPERATING FREQUENCY SETTING PORTION
407
TASK PROCESSING VOLUME DETECTION PORTION
408
1
CPU
404
TIMER EVENT PROCESSING VOLUME DETECTION PORTION
TIMER EVENT EXECUTION PORTION
409
TASK EXECUTION PORTION
14

FIG.12

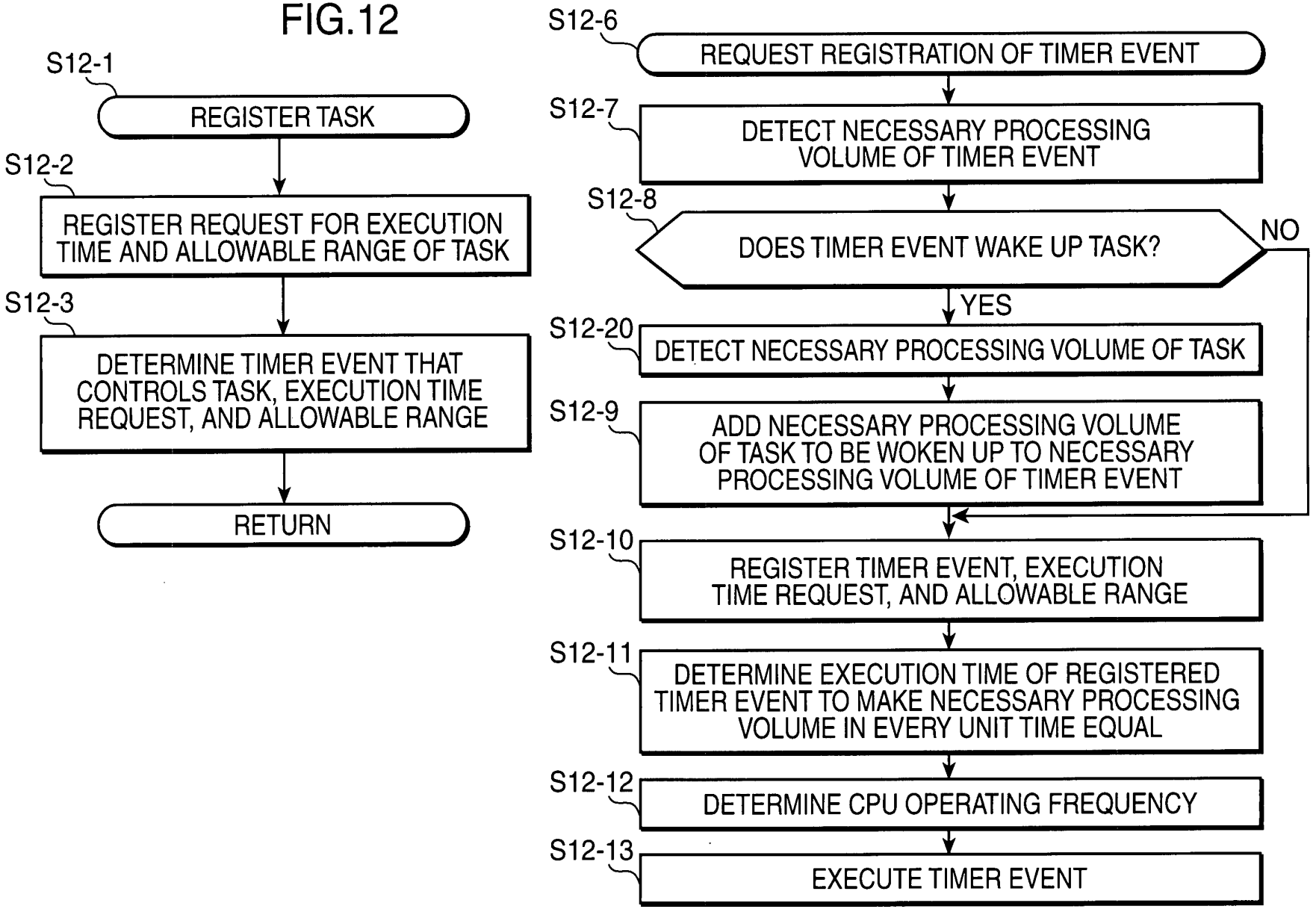

S12-1
REGISTER TASK
S12-2
REGISTER REQUEST FOR EXECUTION TIME AND ALLOWABLE RANGE OF TASK
S12-3
DETERMINE TIMER EVENT THAT CONTROLS TASK, EXECUTION TIME REQUEST, AND ALLOWABLE RANGE
RETURN
S12-6
REQUEST REGISTRATION OF TIMER EVENT
S12-7
DETECT NECESSARY PROCESSING VOLUME OF TIMER EVENT
S12-8
DOES TIMER EVENT WAKE UP TASK?
NO
YES
S12-20
DETECT NECESSARY PROCESSING VOLUME OF TASK
S12-9
ADD NECESSARY PROCESSING VOLUME OF TASK TO BE WOKEN UP TO NECESSARY PROCESSING VOLUME OF TIMER EVENT
S12-10
REGISTER TIMER EVENT, EXECUTION TIME REQUEST, AND ALLOWABLE RANGE
S12-11
DETERMINE EXECUTION TIME OF REGISTERED TIMER EVENT TO MAKE NECESSARY PROCESSING VOLUME IN EVERY UNIT TIME EQUAL
S12-12
DETERMINE CPU OPERATING FREQUENCY
S12-13
EXECUTE TIMER EVENT

FIG.13A1

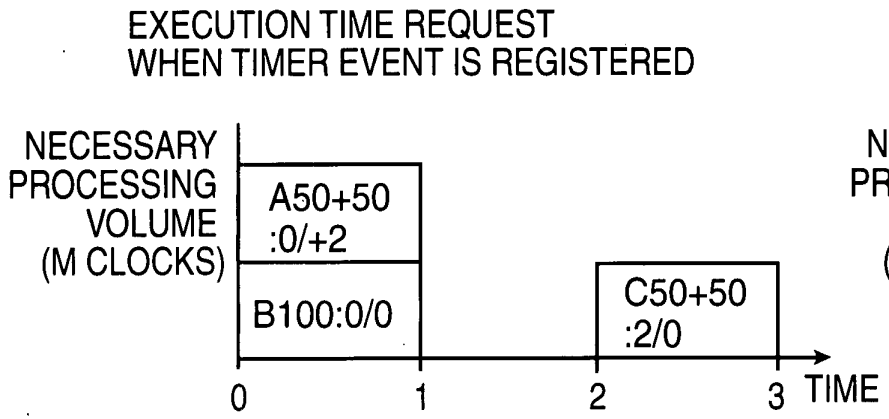


FIG.13A2

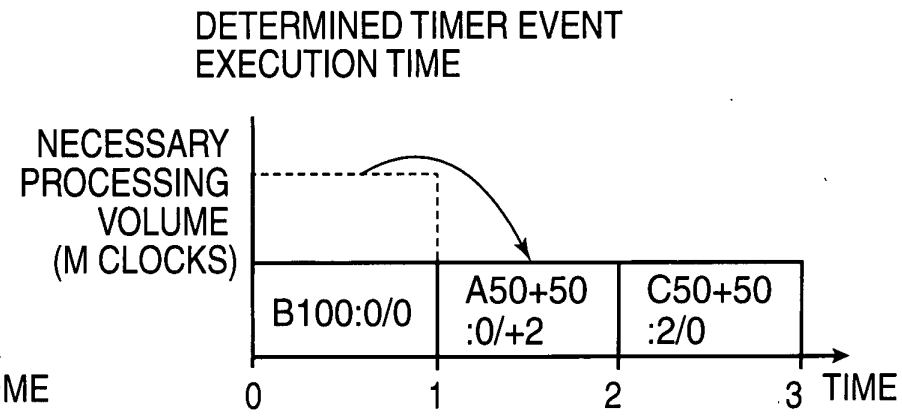
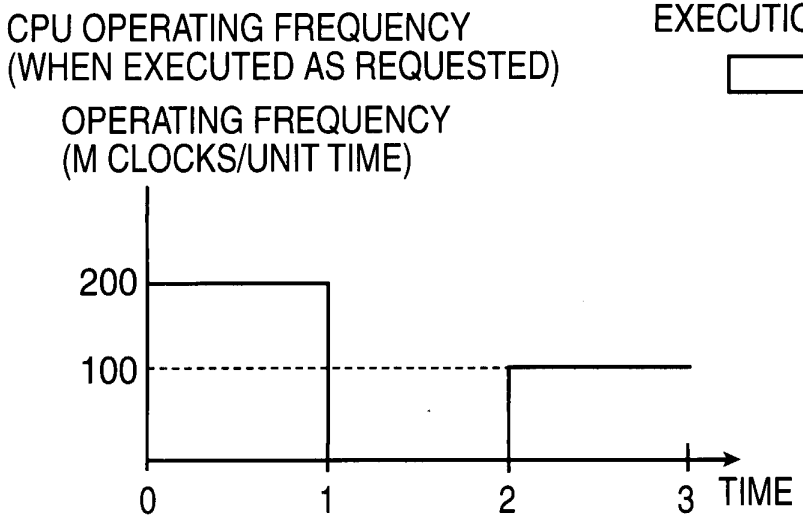


FIG.13B1



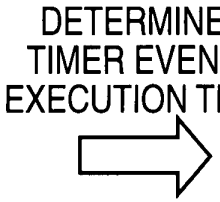


FIG.13B2

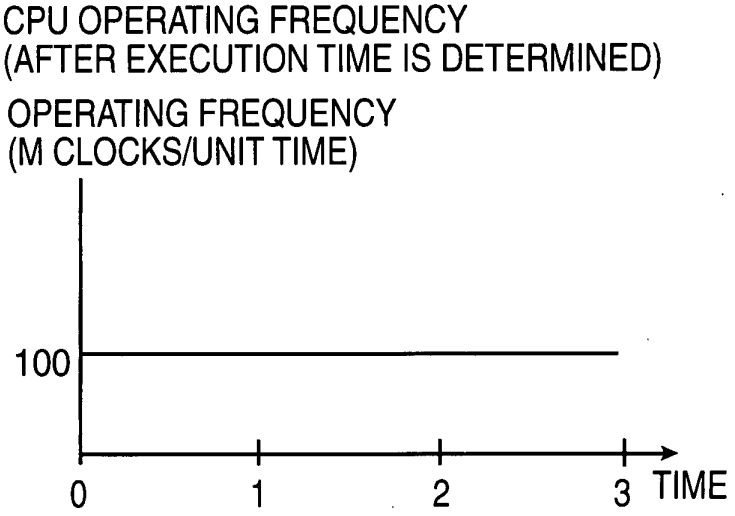


FIG.14A1

EXECUTION TIME REQUEST
WHEN TIMER EVENT IS REGISTERED]

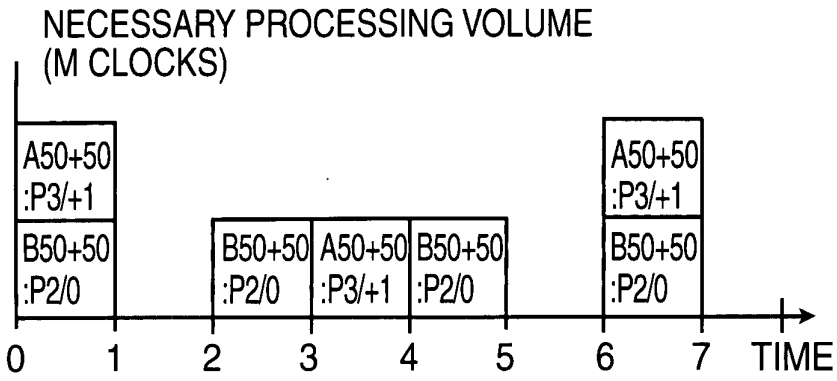


FIG.14A2

DETERMINED TIMER EVENT EXECUTION TIME

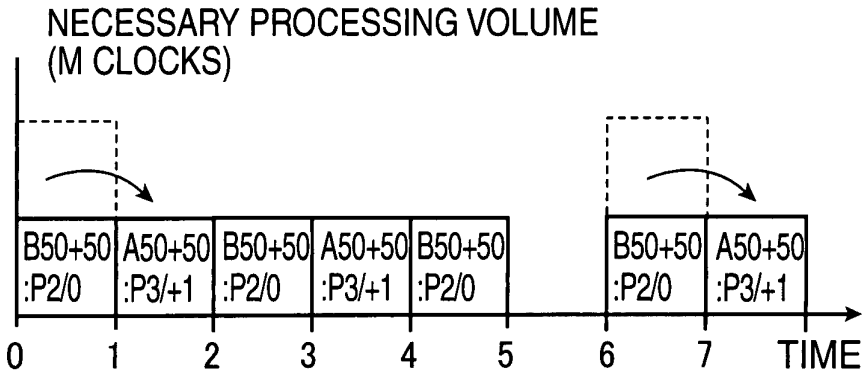
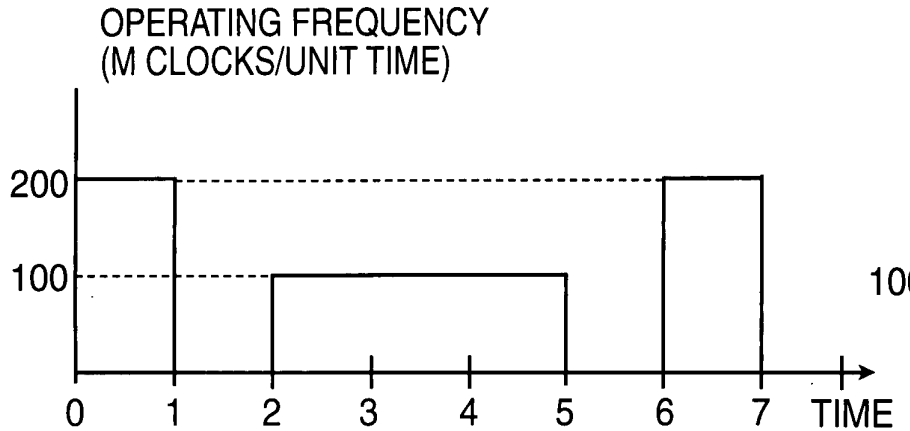
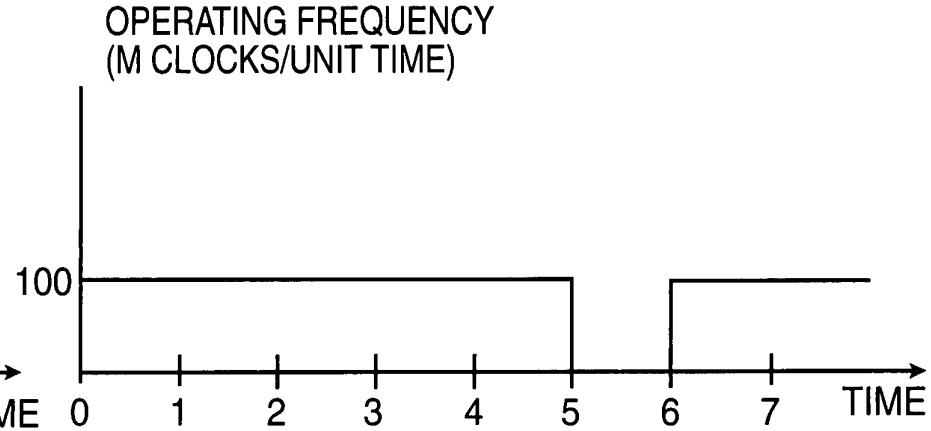


FIG.14B1

CPU OPERATING FREQUENCY
(WHEN EXECUTED AS REQUESTED)



ADJUST PROGRAM
EXECUTION TIME

FIG.14B2

CPU OPERATING FREQUENCY
(AFTER EXECUTION TIME IS DETERMINED)